

Geometry, Measurement and **Finance 10**

Chapter 1: Unit Pricing and Currency Exchange

Lesson 1: Proportional Reasoning

Warm-up:

#1 If a machine can produce 85 parts in 40 minutes, how many parts can it produce in 8 hours??

$$\frac{85}{40} = \frac{x}{480} \quad x = 1020 \text{ parts}$$

#2 If Stephie can type 75 words per minutes, how long will it take her to type an 800-word term paper?

$$\frac{75}{1} = \frac{800}{x} \quad x = 10.67 \text{ mins}$$

#3 If a can of paint will cover 48m^2 of wall space, how many cans will you need to paint 220m^2 ?

$$\frac{48}{1} = \frac{220}{x}$$

$$x = 4.58 \text{ cans} = 5 \text{ cans}$$

#4 The ratio of teeth on a pair of driving gears is 13:6, with the larger gear having more teeth. If the larger gear has 52 teeth, how many does the smaller gear have?

$$13 : 6 = 52 : x$$

$$x = 24 \text{ teeth}$$

#5 If the ratio of flour to sugar in a recipe is 3:2, how much flour would you need if you used 1.5 cups of sugar?

$$3 : 2 = x : 1.5$$

$$x = 2.25 \text{ cups of flour}$$

#6 If 5 cm on a map represents 2.5 km of actual ground, how many centimeters would 15 km of actual ground be on the map?

$$\frac{5 \text{ cm}}{2.5 \text{ km}} = \frac{x}{15 \text{ km}}$$

$$x = 30 \text{ cm}$$

#7 If the ratio of yellow pigment to blue pigment in a shade of green paint is 2:3, how many drops of yellow pigment will be needed if 12 drops of blue are used?

$$2 : 3 = x : 12$$

$$x = 8 \text{ drops of yellow}$$

Review of Solving Proportions & Fractions

Reduce:

$$\frac{20}{45} = \frac{4}{9}$$

$$\frac{34}{72} = \frac{17}{36}$$

Create an Equivalent Fraction:

$$\frac{5}{8} = \frac{10}{16} = \frac{15}{24} = \frac{20}{32}, \text{ etc.}$$

$$\frac{13}{14} = \frac{26}{28} = \frac{39}{42} = \frac{52}{56}, \text{ etc.}$$

Basic principle being used is.....

Proportions

What is a ratio??

Ratio – a comparison between two numbers with the same units.

Example – mixing paint
– 3 parts blue to 1 part green

Blue: green

3:1 = 6:2, or 9:3, etc

What is a proportion?

Proportion – a fractional statement of equality between two ratios or rates.

The paint example can be expressed as a proportion

Blue/Green

$3/1 = 9/3$

Example 1

Engines requiring a mixture of oil and fuel to provide lubrication are called 2-stroke engines. Lisa lives in McCallum, Newfoundland, and uses her boat for transportation. Her boat motor's tank holds 25 L of fuel. The ratio of gasoline to oil required is 50 parts of gasoline to 1 part of oil. Lisa mixes the fuel and oil in a 30-L jerry can before filling up her boat's tank.

How much oil should be added to the gasoline?

Method 1

$$\frac{51}{1} = \frac{25}{x}$$

$$\frac{51(x)}{1} = \frac{25(x)}{x}$$

$$51x = 25$$

$$x = 0.49 \text{ L of oil}$$

Method 2

$$\frac{51}{1} = \frac{25}{x}$$

$$\frac{51(0.4901)}{1(0.4901)} = \frac{25}{x}$$

$$x = 0.49 \text{ L of oil}$$

Your Turn

Jean-Luc, a builder, works in Kentville, Nova Scotia. He has found that he can arrange the work cubicles of his employees best if the ratio between the length and the width of a room is 3:2.

If a room is 6 m long, how wide should the room be?

$$3 : 2 = 6 : x$$

$$x = 4 \text{ m long}$$

To Do:

$$1) \frac{9}{6} = \frac{k}{7} \quad k = 10.5$$

$$2) \frac{9}{n} = \frac{7}{9} \quad n = 11.57$$

$$3) \frac{4}{3} = \frac{5}{x} \quad x = 3.75$$

$$4) \frac{7}{8} = \frac{9}{x} \quad x = 10.29$$

$$5) \frac{7}{m} = \frac{8}{10} \quad m = 8.75$$

$$6) \frac{n}{2} = \frac{5}{9} \quad n = 1.11$$

$$7) \frac{2}{p} = \frac{3}{6} \quad p = 4$$

$$8) \frac{8}{6} = \frac{4}{n} \quad n = 3$$

$$9) \frac{9}{10} = \frac{6}{b} \quad b = 6.67$$

$$10) \frac{r}{3} = \frac{7}{6} \quad r = 3.5$$

$$11) \frac{x}{7} = \frac{3}{8} \quad x = 2.625$$

$$12) \frac{b}{3} = \frac{5}{9} \quad b = 1.67$$

$$13) \frac{10}{n} = \frac{4}{7} \quad n = 17.4$$

$$14) \frac{v}{7} = \frac{3}{10} \quad v = 2.1$$

$$15) \frac{10}{3} = \frac{6}{x} \quad x = 1.8$$

$$16) \frac{9}{5} = \frac{x}{8} \quad x = 14.4$$

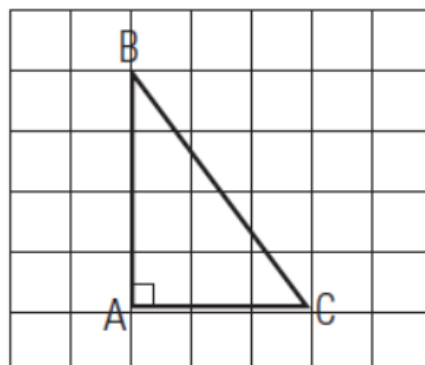
$$17) \frac{a}{4} = \frac{4}{9} \quad a = 1.78$$

$$18) \frac{k}{10} = \frac{8}{6} \quad k = 13.3$$

ACTIVITY 1.1 VISUALIZE A PROPORTION

A right triangle is created by joining the ends of two line segments drawn at 90° to each other, as shown below.

1. Copy the triangle below onto a sheet of 0.5 cm graph paper.



2. For each item, draw the new figure and determine whether the new figure is proportional to the original figure or whether it is distorted.

a) Double the length of line segments AB and AC.

$$4 : 3 = 8 : 6 \quad \text{proportional}$$

b) Add three squares on the graph to the length of each of these segments.

$$4 : 3 \neq 7 : 6 \quad \text{Distorted}$$

c) Subtract 2 squares from the length of each of these segments.

$$4 : 3 \neq 2 : 1 \quad \text{Distorted}$$

d) Divide the length of each of these segments by 2.

$$4 : 3 = 2 : 1.5 \quad \text{Proportional}$$

3. What conclusions can you draw from your results? Ratios or Proportions must multiplied or divided to maintain equivalent ratios or proportions